ONE WORLD ○ OUR APPROVAL

Test report

471457-1R2TRFWL

Date of issue: September 6, 2022

Applicant:
Avnet, Inc.

Product:
Azure Sphere MT3620 Module

Model:
AES-MS-MT3620-M-G-3

FCC ID:
2AF62-AVT3620C3

IC ID:
21571-AVT3620C3

Specifications:

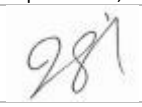
- FCC 47 CFR Part 15, Subpart C – §15.407
  General technical requirements
- Industry Canada RSS-247, Issue 2
  Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Nemko USA Inc., a testing laboratory, is accredited by NVLAP. The tests included in this report are within the scope of this accreditation.

NVLAP TESTING NVLAP LAB CODE 200116-0 ilac-MRA

Lab and test locations

Company name	Nemko USA Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	Martha Espinoza, Wireless Test Engineer
Reviewed by	James Cunningham, EMC/MIL/WL Supervisor
Review date	September 6, 2022
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Copyright notification

Table of Contents

Section 1 Report summary

1.1 Applicant

Company name	Avnet, Inc.
Address	2211 South 47th Street
City	Phoenix
State	AZ
Postal/Zip code	85034
Country	USA

1.2 Manufacturer

Company name	Avnet, Inc.
Address	2211 South 47th Street
Phoenix	Phoenix
State	AZ
Postal/Zip code	85034
Country	USA

1.3 Test specifications

FCC 47 CFR Part 15, Subpart C – §15.407	General technical requirements
IC RSS-247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.4 Test methods

ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
558074 D01 DTS Measurement Guidance v03r02 (June 5, 2014)	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.5 Exclusions

None

1.6 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.7 Test report revision history

Table 1.7-1: *Test report revision history*

Revision #	Details of changes made to test report
471457-1R2TRFWL	Original report issued
471457-1R1TRFWL	Changes requested by manufacturer: Product name, image page 7, model page 6, frequency typo page 19.
471457-1R2TRFWL	Added EUT serial number.

Notes: None

Section 2 Summary of test results

2.1 FCC Part 15 Subpart C, general requirements

Part	Test description	Verdict
§15.207(a)	Conducted limits	Pass
§15.31(e)	Variation of power source	Pass
§15.203	Antenna requirement	Pass

Notes: EUT is AC powered
The antenna is located within the protective cover of EUT on PCB

2.2 FCC Part 15.407

Part	Test description	Verdict
§15.407(a)	Power limits	Pass
§15.407(b)	Undesirable emission limits	Pass
§15.407(c)	Automatic transmission termination	Not applicable
§15.407(d)	Operational restrictions for 6 GHz U-NII devices	Not applicable
§15.407(e)	Minimum 6 dB bandwidth	Pass
§15.407(f)	Radio frequency radiation exposure requirements	Not applicable
§15.407(g)	U-NII devices frequency stability	Pass
§15.407(h)	Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)	Pass
§15.407(i)	Operational Modes	Not applicable
§15.407(j)	Operator Filing Requirement	Not applicable
§15.407(k)	Automated frequency coordination (AFC) system	Not applicable
§15.407(l)	Incumbent Protection by AFC system: Fixed Microwave Services	Not applicable
§15.407(m)	Incumbent Protection by AFC system: Radio Astronomy Services	Not applicable
§15.407(n)	Incumbent Protection by AFC system: Fixed-Satellite Services	Not applicable

2.3 IC RSS-247, Issue 2

Part	Test description	Verdict
6.2	Power and unwanted emission limits	Pass
6.3	Dynamic frequency selection for devices operating in the bands 5250-5350 MHz, 5470-5600 MHz, and 5650-5725 MHz	Pass
6.4	Additional requirements	Not applicable

2.4 IC RSS-GEN, Issue 5

Part	Test description	Verdict
7.3	Receiver radiated emission limits	Not applicable
7.4	Receiver conducted emission limits	Not applicable
8.8	Power Line Conducted Emissions Limits for License-Exempt Radio Apparatus	Pass

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date	May 2, 2022
Nemko sample ID number	NEx: 463869

3.2 EUT information

Product name	Azure Sphere MT3620 Module
Model	AES-MS-MT3620-M-G-3
Serial number	00:02:B5:03:D5:FC
Part number	N/A

3.3 Technical information

Frequency bands	U-NII-1: 5150-5250 MHz U-NII-2A: 5250-5350 MHz U-NII-2C: 5470-5725 MHz U-NII-3: 5725-5850 MHz
Minimum frequency (MHz)	5150 MHz
Maximum frequency (MHz)	5850 MHz
Type of modulation	IEEE 802.11n
Power requirements	3.3V
Antenna information	5.2 dBi gain, Dual band ceramic antenna

3.4 EUT exercise and monitoring details

EUT was tested in IEEE 802.11n wireless network specifications, with 20 MHz channel bandwidth, on the low, mid, and high channels.

Table 3.4-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number	Rev.
---	---	---	--	--

Table 3.4-2: *EUT interface ports*

Description	Qty.
USB Port	1

Table 3.4-3: *Support equipment*

Description	Brand name	Model/Part number	Serial number	Rev.
Laptop	Dell	Inspiron 15/BX6N5L2	25951147526	--

Table 3.4-4: *Inter-connection cables*

Cable description	From	To	Length (m)
--	--	--	--

3.5 EUT setup diagram

Figure 3.5-1: *Setup diagram*

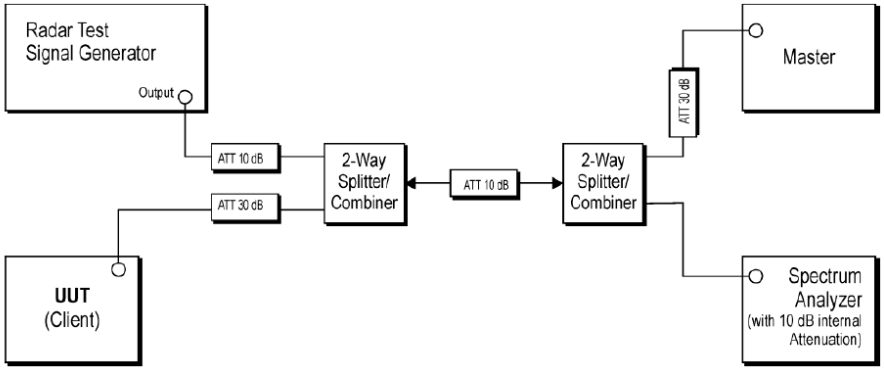


Figure 3.5-2: *Setup diagram for DFS test.*

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15-30 °C
Relative humidity	20-75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Test name	Measurement uncertainty, dB
Radiated spurious emissions	3.78
Powerline conducted emissions	1.38
All antenna port measurements	0.55
Conducted spurious emissions	1.13

Section 7 Test Equipment

Table 6.1-1: *Test Equipment List*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver	Rohde & Schwarz	ESU40	E1131	02-Mar-2022	02-Mar-2023
Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	E1120	09-Dec-2021	09-Dec-2023
PXI RF Synthesizer	Aeroflex International Ltd	PXI-1042 Series	E1060	16-Feb-2021	16-Feb-2023
System Controller	Sunol Sciences	SC 104V	E1191	NCR	NCR
Power sensor	ETS-Lindgren	7002-006	E1062	01-Nov-2021	01-Nov-2022
Antenna, Bilog	Schaffner-Chase	CBL 6111D	1763	01-April-2022	01-April-2024
Antenna, DRG Horn	ETS-Lindgren	3117-PA	E1139	19-April-2021	19-Apr-2023
WR-42 Rectangular Gain Horn	Sage Millimeter	SAR-2309-42-S2	E1143	13-Nov-2020	13-Nov-2022
WR-28 Rectangular Gain Horn	Sage Millimeter	SAR-2309-28-D2	E1148	05-Nov-2020	05-Nov-2022
Low Noise Amplifier	Sage Millimeter	SBL-1834034030-KFKF	E1228	NCR	NCR
DFS and Adaptivity system	Aeroflex	PXI 30xx	E1060	05-Nov-2021	05-Nov-2022
Power Splitter	Mini-Circuits	ZFRSC-123-S+	SF564001335	VOU	VOU
Power Splitter	Mini-Circuits	ZFRSC-123-S+	SF564001335	VOU	VOU

Notes: NCR - no calibration required

Table 6.1-2: *Test Software*

Manufacturer of Software	Details
Rohde & Schwarz	EMC 32 V10.60.15 (radiated emissions)

Notes: None

Section 8 Testing data

8.1 FCC 15.407(a) and RSS-247 Power Limits

8.1.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart E → §15.407(a)

8.1.2 Test summary

Verdict	Pass		
Test date	June 27, 2022; June 29, 2022	Temperature	21 °C; 23 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1003 mbar; 1005 mbar
Test location	Wireless bench	Relative humidity	51 %; 55%

8.1.3 Notes

Testing was performed in Tx mode and the EUT transmitting on a fixed channel at default power. Low, Middle, and High channel were tested using all the modulations declared by manufacturer used in IEEE 802.11n: MCS0 to MCS7 (except U-NII-2C band in which an extra straddle channel was also tested). Based on the results, worst case modulation was selected and used for other testing of this document. Only one bandwidth was declared by manufacturer.

The attenuation of the interconnecting cable was included in the power meter software as a correction factor.

The antenna gain is 5.2 dBi per client declaration.

EIRP = Conducted Power + Declared Antenna Gain; Conducted limit: 23.98 dBm (250 mw); EIRP limit = 29.98 dBm (995.4054 mw).

8.1.4 Setup details

EUT setup configuration	Tabletop
Test facility	Nemko San Diego
Measurement method	ANSI C63.10 §11.9.2.3.1 Method AVGPM

8.1.5 Test data

Table 8.1-1: *Output power U-NII-1 band: 5150-5250 MHz*

Channel		IEEE 802.11n: Power (dBm)							
	Frequency	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
36	5180 MHz	13.89	13.83	13.82	13.97	13.96	13.97	13.83	13.75
44	5220 MHz	13.92	**13.99**	13.80	13.97	13.91	13.75	13.78	13.97
48	5240 MHz	13.88	13.95	13.57	13.67	13.72	13.81	13.90	13.73

Table 8.1-2: *Output power U-NII-2A band: 5250-5350 MHz*

Channel		IEEE 802.11n: Power (dBm)							
	Frequency	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
52	5260 MHz	13.87	13.88	13.95	13.95	13.85	13.82	13.71	**13.99**
60	5300 MHz	13.52	13.57	13.89	13.85	13.82	13.84	13.74	13.52
64	5320 MHz	13.65	13.64	13.67	13.86	13.56	13.73	13.47	13.82

Table 8.1-3: *Output power U-NII-2C band: 5470-5725 MHz*

Channel		IEEE 802.11n: Power (dBm)							
	Frequency	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
100	5500 MHz	13.21	13.15	13.08	13.08	13.10	13.33	13.17	13.12
124	5620 MHz	13.92	13.83	13.87	13.77	13.75	**13.95**	13.88	13.74
144	5720 MHz	13.40	13.54	13.52	13.64	13.38	13.56	13.60	13.55

8.1.5 Test data, continued

Table 8.1-4: *Output power U-NII-3 band: 5725-5850 MHz*

Channel		IEEE 802.11n: Power (dBm)							
	Frequency	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
149	5745 MHz	13.77	13.74	13.91	13.73	13.92	13.82	14.07	13.89
157	5785 MHz	**14.09**	13.99	13.99	14.04	14.04	14.01	14.01	14.02
165	5825 MHz	12.89	12.82	12.82	12.79	12.77	12.79	12.76	12.81

Based on results of table 8.1.4, MCS0 is considered as worst case. By client request the power was reduced to the follow levels:

Table 8.1-5: *Output power U-NII-3 band: 5725-5850 MHz, IEEE 802.11n MCS0, with reduced power*

Channel	Frequency	IEEE 802.11n: Power (dBm) MCS0
149	5745 MHz	8.59
157	5785 MHz	8.58
165	5825 MHz	8.38

Based on the results above, the highest power in each band is considered as worst case.
U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case) → Power defined by software to get the power table 8.1.1: 16 dBm
U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case). → Power defined by software to get the power table 8.1.2: 16 dBm
U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case). → Power defined by software to get the power table 8.1.3: default
U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case). → Power defined by software to get the power table 8.1.4: default
U-NII-3 band: 5725-5850 MHz, reduced power → IEEE 802.11n MCS0 (worst case). → Power defined by software to get the power table 8.1.5: 10 dBm

Operating Mode	Test Frequency (MHz)	Maximum Conducted Power (dBm)	Maximum Conducted Power (mW)	Declared Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)
IEEE 802.11n MCS1; 20 MHz bandwidth; Channel 36	5180	13.83	24.15460	5.2	19.03	79.98342
IEEE 802.11n MCS1; 20 MHz bandwidth; Channel 44	5220	**13.99**	25.06109	5.2	19.19	82.98501
IEEE 802.11n MCS1; 20 MHz bandwidth; Channel 48	5240	13.95	24.83133	5.2	19.15	82.22426
IEEE 802.11n MCS7; 20 MHz bandwidth; Channel 52	5260	**13.99**	25.06109	5.2	19.19	82.98501
IEEE 802.11n MCS7; 20 MHz bandwidth; Channel 60	5300	13.52	22.49054	5.2	18.72	74.47319
IEEE 802.11n MCS7; 20 MHz bandwidth; Channel 64	5320	13.82	24.09901	5.2	19.02	79.79946
IEEE 802.11n MCS5; 20 MHz bandwidth; Channel 100	5500	13.33	21.52781	5.2	18.53	71.28530
IEEE 802.11n MCS5; 20 MHz bandwidth; Channel 124	5620	**13.95**	24.83133	5.2	19.15	82.22426
IEEE 802.11n MCS5; 20 MHz bandwidth; Channel 144	5720	13.56	22.69864	5.2	18.76	75.16228
IEEE 802.11n MCS0; 20 MHz bandwidth; Channel 149	5745	**8.59**	7.227698	5.2	13.79	23.93315
IEEE 802.11n MCS0; 20 MHz bandwidth; Channel 157	5785	8.58	7.211074	5.2	13.78	23.87811
IEEE 802.11n MCS0; 20 MHz bandwidth; Channel 165	5825	8.38	6.886522	5.2	13.58	22.80342

Table 8.1-6: *Output power and E.I.R.P.*

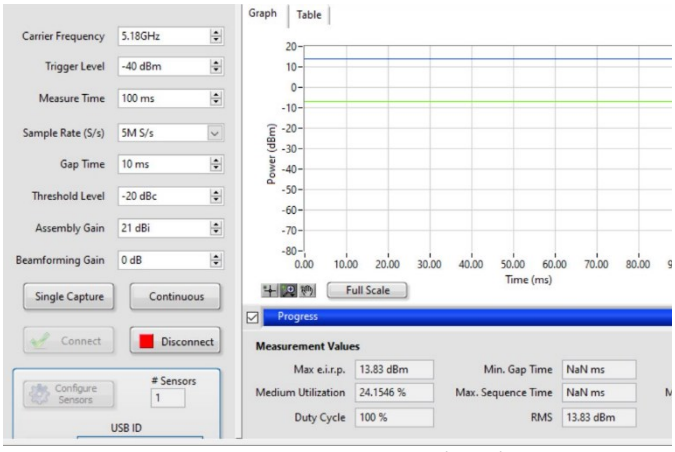


Figure 8.1-1: *IEEE 802.11n MCS1 20 MHz BW, Channel 36: 5180 MHz*

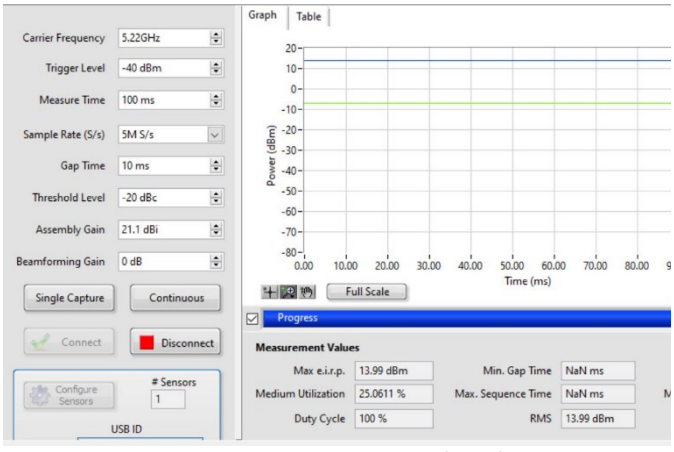


Figure 8.1-2: *IEEE 802.11n MCS1 20 MHz BW, Channel 44: 5220 MHz*

8.1.5 Test data, continued

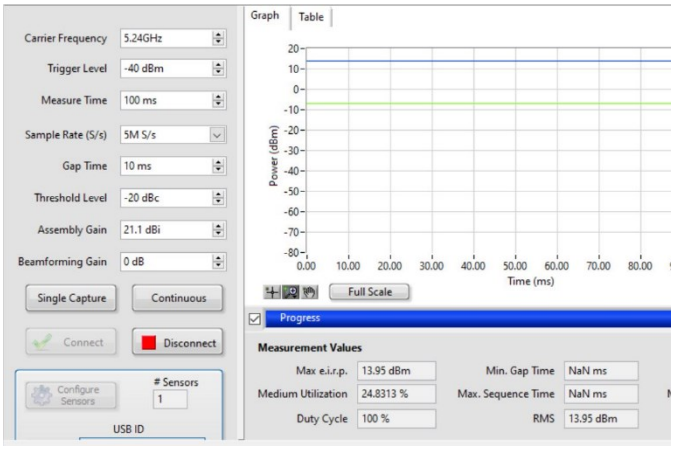


Figure 8.1-3: *IEEE 802.11n MCS1 20 MHz BW, Channel 48: 5240 MHz*

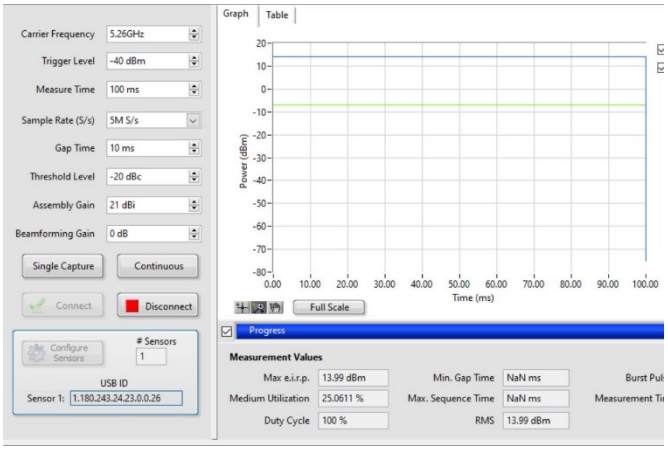


Figure 8.1-4: *IEEE 802.11n MCS7 20 MHz BW, Channel 52: 5260 MHz*

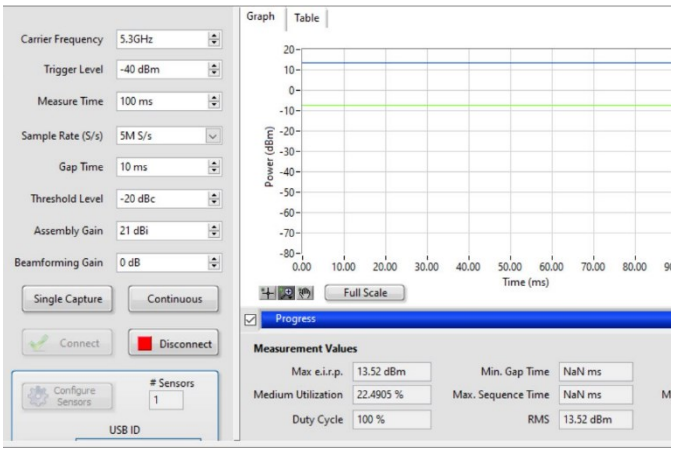


Figure 8.1-5: *IEEE 802.11n MCS7 20 MHz BW, Channel 60: 5300 MHz*

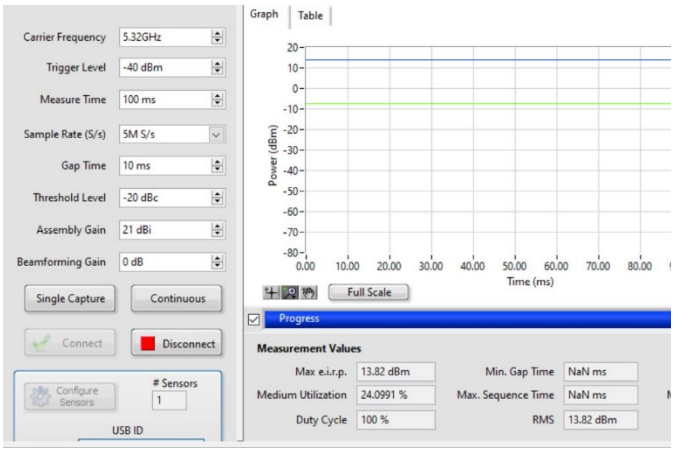


Figure 8.1-6: *IEEE 802.11n MCS7 20 MHz BW, Channel 64: 5320 MHz*

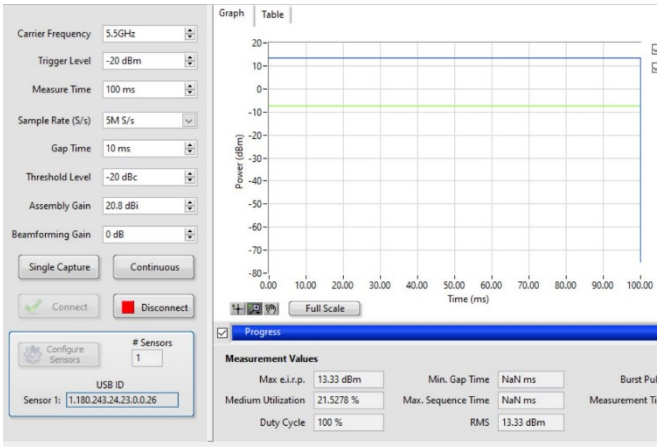


Figure 8.1-7: *IEEE 802.11n MCS5 20 MHz BW, Channel 100: 5500 MHz*

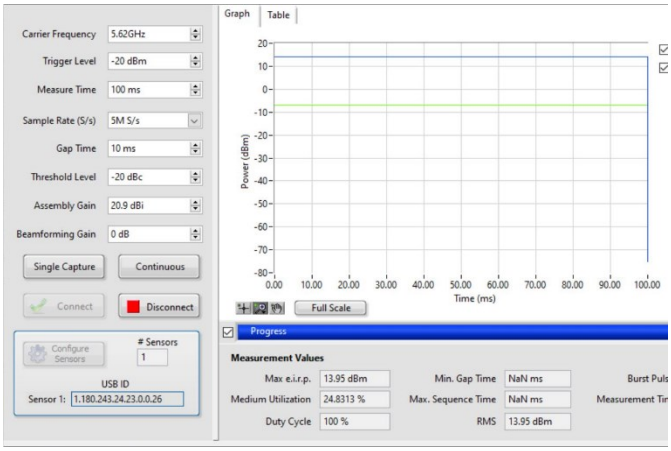


Figure 8.1-8: *IEEE 802.11n MCS5 20 MHz BW, Channel 124: 5620 MHz*

8.1.5 Test data, continued

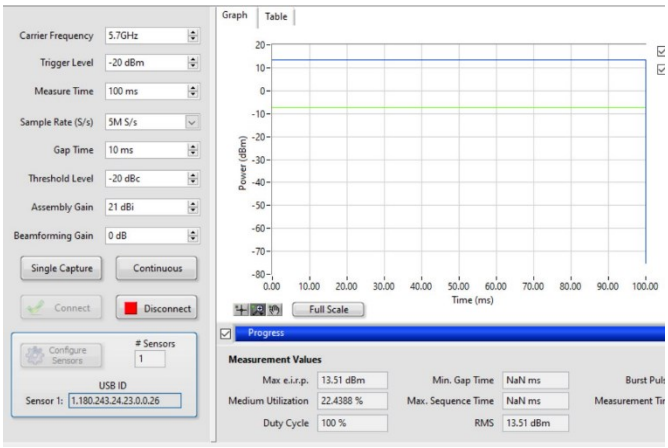


Figure 8.1-9: *IEEE 802.11n MCS5 20 MHz BW, Channel 140: 5700 MHz*

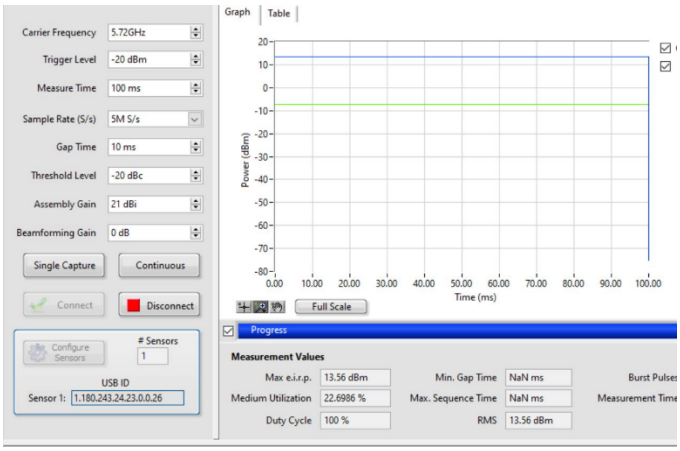


Figure 8.1-10: *IEEE 802.11n MCS5 20 MHz BW, Channel 144: 5720 MHz*

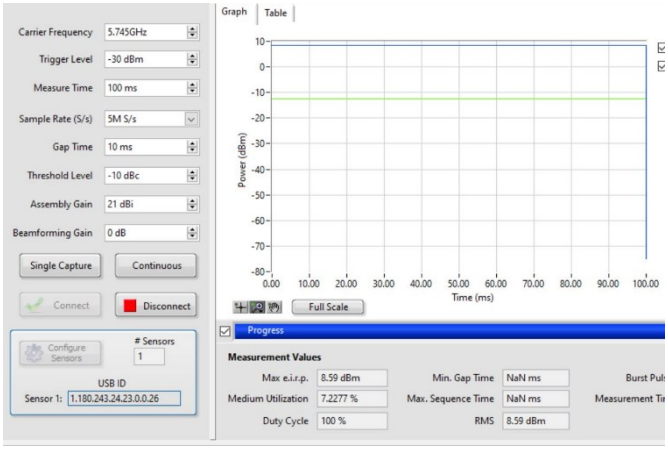


Figure 8.1-11: *IEEE 802.11n MCS0 20 MHz BW, Channel 149: 5745 MHz*

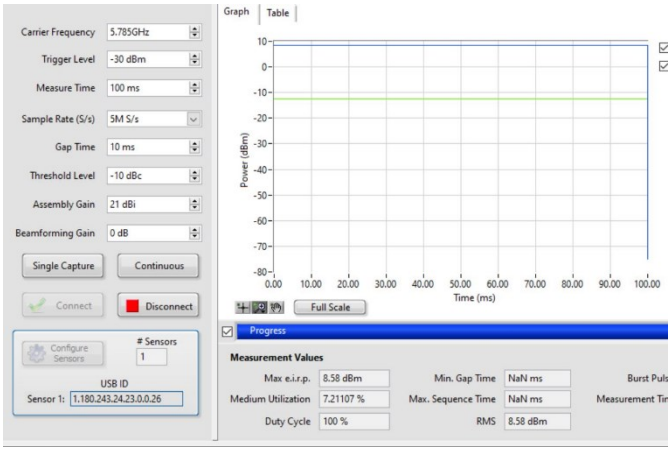


Figure 8.1-12: *IEEE 802.11n MCS0 20 MHz BW, Channel 157: 5785 MHz*

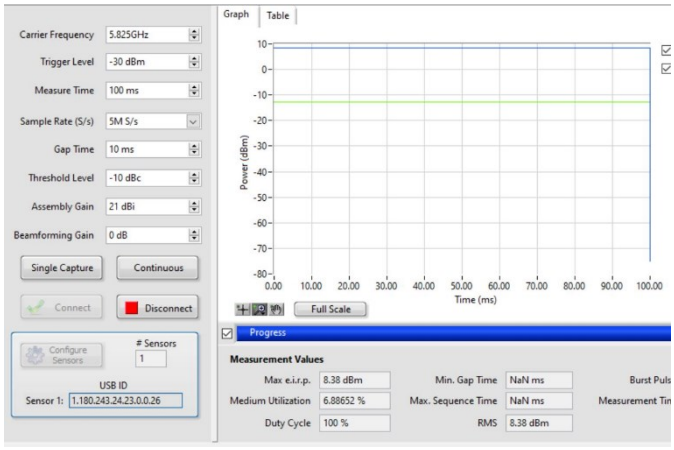


Figure 8.1-13: *IEEE 802.11n MCS0 20 MHz BW, Channel 165: 5825 MHz*

8.2 FCC 15.407(a) and RSS-247 99% Occupied Bandwidth

8.2.1 Definition and limits

KDB 789033 D02 (D)

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with Section 15.407(a).

8.2.2 Test summary

Verdict	Pass		
Test date	June 30, 2022	Temperature	22 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1004 mbar
Test location	Wireless bench	Relative humidity	53 %

8.2.3 Notes

Testing was performed in Tx mode and the EUT transmitting on a fixed channel. Low, Middle, and High channel were tested using worst case modulation for each band. Only one bandwidth was declared by manufacturer.

U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case)
U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case)
U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case)
U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case)

8.2.4 Setup details

Receiver settings

Resolution bandwidth	1% to 5% of the OBW
Video bandwidth	≥ 3 x RBW
Span	1.5 time to 5.0 times the OBW
Detector mode	Peak
Trace mode	Max Hold

8.2.5 Test data

Channel	Frequency	99% OBW
CH 36 IEEE 802.11n MCS1	5180 MHz	16.503 MHz
CH 44 IEEE 802.11n MCS1	5220 MHz	16.503 MHz
CH 48 IEEE 802.11n MCS1	5240 MHz	16.503 MHz
CH 52 IEEE 802.11n MCS7	5260 MHz	16.543 MHz
CH 60 IEEE 802.11n MCS7	5300 MHz	16.503 MHz
CH 64 IEEE 802.11n MCS7	5320 MHz	16.503 MHz
CH 100 IEEE 802.11n MCS5	5500 MHz	16.503 MHz
CH 124 IEEE 802.11n MCS5	5620 MHz	16.503 MHz
CH 144 IEEE 802.11n MCS5	5720 MHz	16.503 MHz
CH 149 IEEE 802.11n MCS0	5745 MHz	16.503 MHz
CH 157 IEEE 802.11n MCS0	5785 MHz	16.503 MHz
CH 165 IEEE 802.11n MCS0	5825 MHz	16.543 MHz

Table 8.2-1: *99% Occupied bandwidth.*

8.2.5 Test data, continued

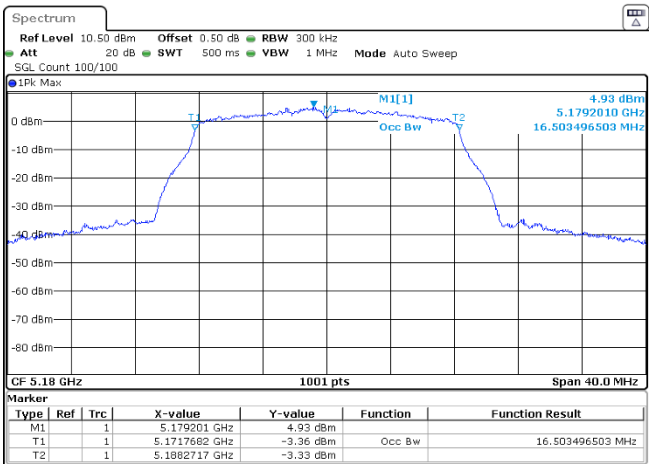


Figure 8.2-1: *99% OBW IEEE 802.11n MCS1, Channel 36: 5180 MHz*

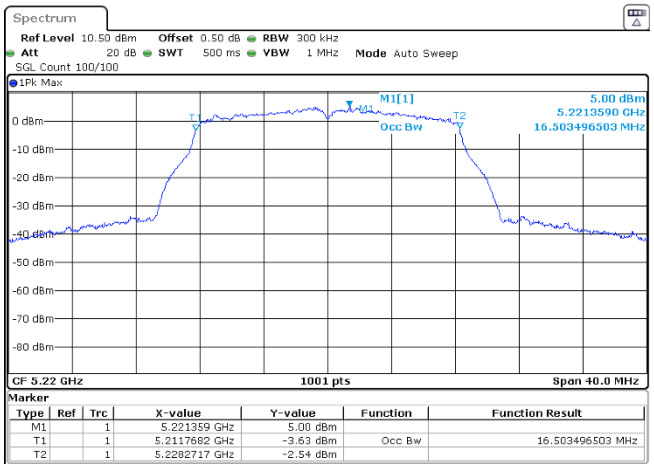


Figure 8.2-2: *99% OBW IEEE 802.11n MCS1, Channel 44: 5220 MHz*

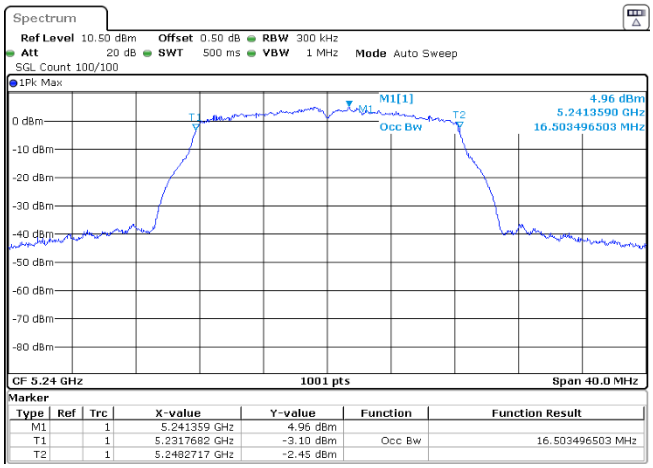


Figure 8.2-3*: 99% OBW IEEE 802.11n MCS1, Channel 48: 5240 MHz*

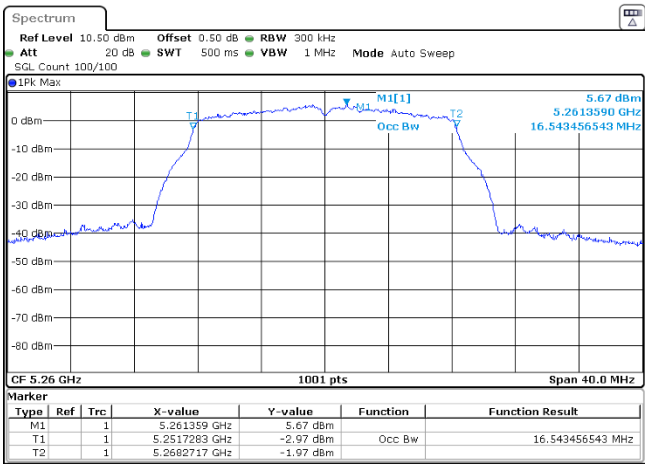


Figure 8.2-4: *99% OBW IEEE 802.11n MCS7, Channel 52: 5260 MHz*

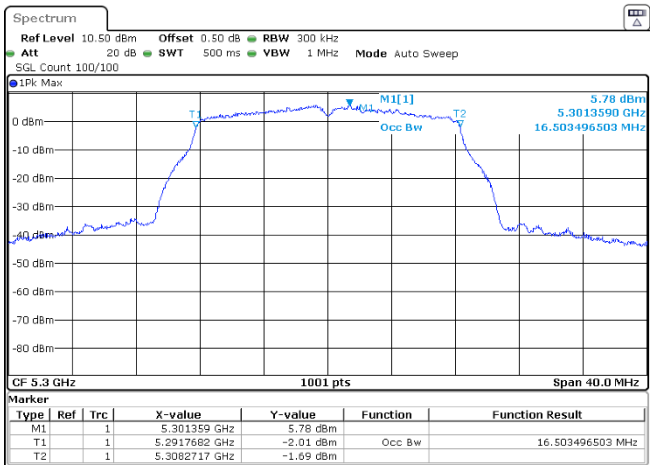


Figure 8.2-5: *99% OBW IEEE 802.11n MCS7, Channel 60: 5300 MHz*

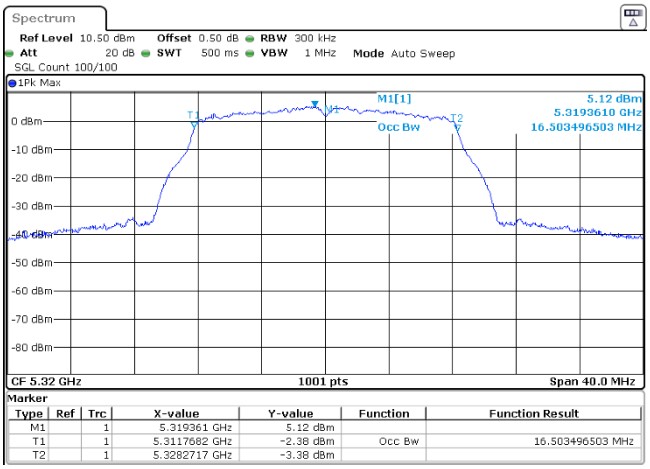


Figure 8.2-6*: 99% OBW IEEE 802.11n MCS7, Channel 64: 5320 MHz*

8.2.6 Test data, continued

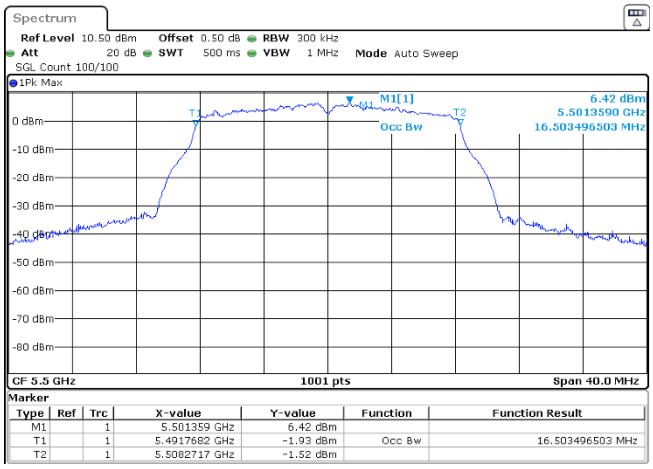


Figure 8.2-7: *99% OBW IEEE 802.11n MCS5, Channel 100: 5500 MHz*

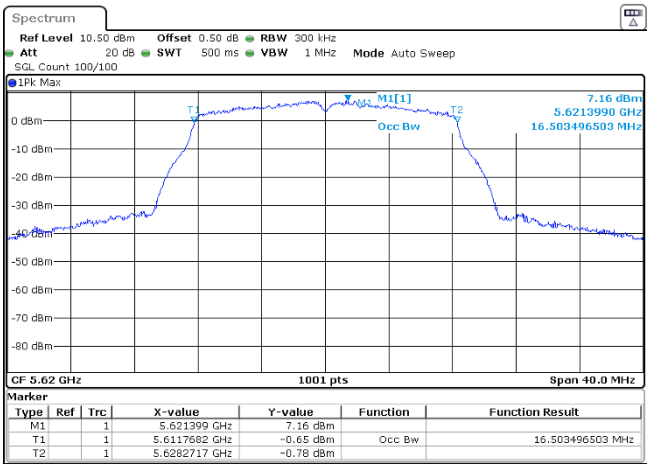


Figure 8.2-8: *99% OBW IEEE 802.11n MCS5, Channel 124: 5620 MHz*

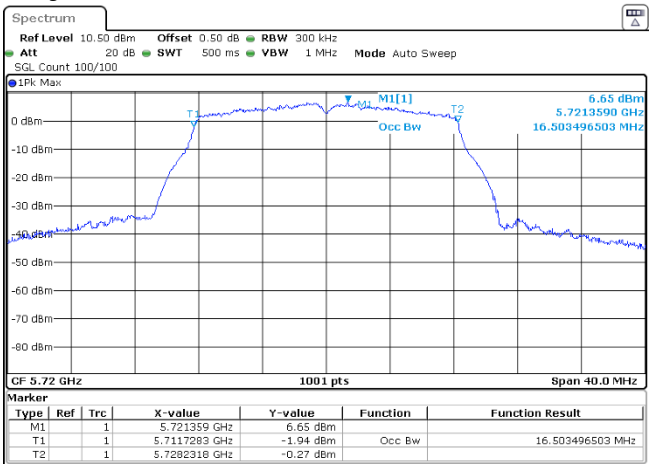


Figure 8.2-9: *99% OBW IEEE 802.11n MCS5, Channel 144: 5720 MHz*

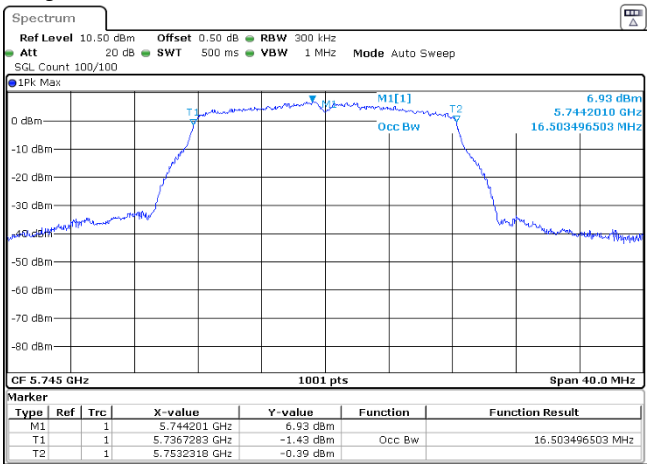


Figure 8.2-10: *99% OBW IEEE 802.11n MCS0, Channel 149: 5745 MHz*

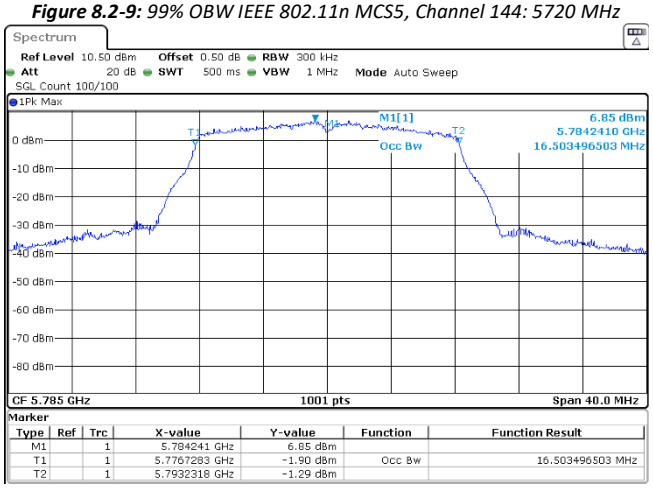


Figure 8.2-11: *99% OBW IEEE 802.11n MCS0, Channel 157: 5785 MHz*

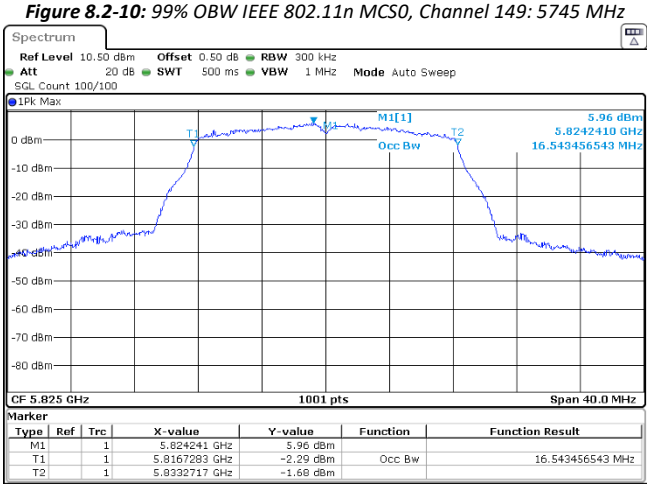


Figure 8.2-12: *99% OBW IEEE 802.11n MCS0, Channel 165: 5825 MHz*

8.3 FCC 15.407(a) and RSS-247 Emission Bandwidth

8.3.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart E → §15.407(e)

KDB 789033 D02

Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

8.3.2 Test summary

Verdict	Pass		
Test date	July 1, 2022	Temperature	21 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1004 mbar
Test location	Wireless bench	Relative humidity	52 %

8.3.3 Notes

Testing was performed in Tx mode and the EUT transmitting on a fixed channel. Low, Middle, and High channel were tested using worst case modulation for each band. Only one bandwidth was declared by manufacturer.

U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case) → 26 dB OBW
U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case) → 26 dB OBW
U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case) →26 dB OBW
U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case) → 6 dB OBW

8.3.4 Setup details

Receiver settings

Resolution bandwidth	1% of emission bandwidth (5150-5725 MHz band); 100 kHz (5725-5850 MHz band)
Video bandwidth	VBW > RBW (5150-5725 MHz band); ≥ 3 x RBW (5725-5850 MHz band)
Span	1.5 time to 5.0 times the OBW
Detector mode	Peak
Trace mode	Max Hold

8.3.5 Test data

Channel	Frequency	26 dB OBW	Limit
CH 36 IEEE 802.11n MCS1	5180 MHz	20.005 MHz	N/A
CH 44 IEEE 802.11n MCS1	5220 MHz	20.005 MHz	N/A
CH 48 IEEE 802.11n MCS1	5240 MHz	19.870 MHz	N/A
CH 52 IEEE 802.11n MCS7	5260 MHz	19.915 MHz	N/A
CH 60 IEEE 802.11n MCS7	5300 MHz	20.050MHz	N/A
CH 64 IEEE 802.11n MCS7	5320 MHz	20.005 MHz	N/A
CH 100 IEEE 802.11n MCS5	5500 MHz	20.095 MHz	N/A
CH 124 IEEE 802.11n MCS5	5620 MHz	20.005 MHz	N/A
CH 144 IEEE 802.11n MCS5	5720 MHz	19.780 MHz	N/A
Channel	**Frequency**	**6 dB OBW**	**Limit**
CH 149 IEEE 802.11n MCS0	5745 MHz	12.787 MHz	≥ 500 kHz
CH 157 IEEE 802.11n MCS0	5785 MHz	12.828 MHz	≥ 500 kHz
CH 165 IEEE 802.11n MCS0	5825 MHz	12.947 MHz	≥ 500 kHz

Table 8.3-1: *Emission bandwidth.*

8.3.5 Test data, continued

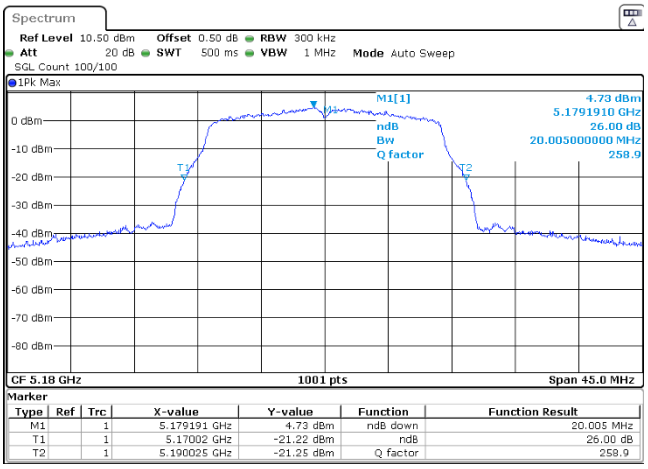


Figure 8.3-1: *26 dB Emission Bandwidth IEEE 802.11n MCS1, Channel 36: 5180 MHz*

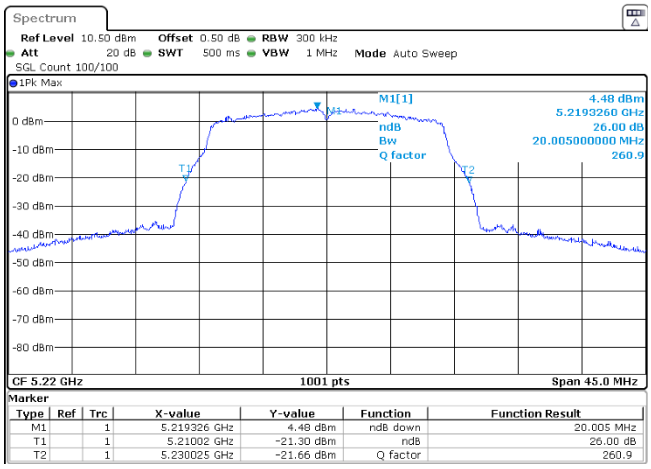


Figure 8.3-2: *26 dB Emission Bandwidth IEEE 802.11n MCS1, Channel 44: 5220 MHz*

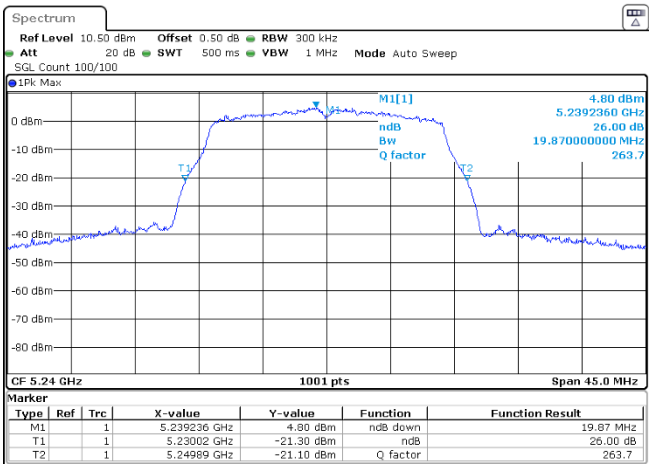


Figure 8.3-3*: 26 dB Emission Bandwidth IEEE 802.11n MCS1, Channel 48: 5240 MHz*

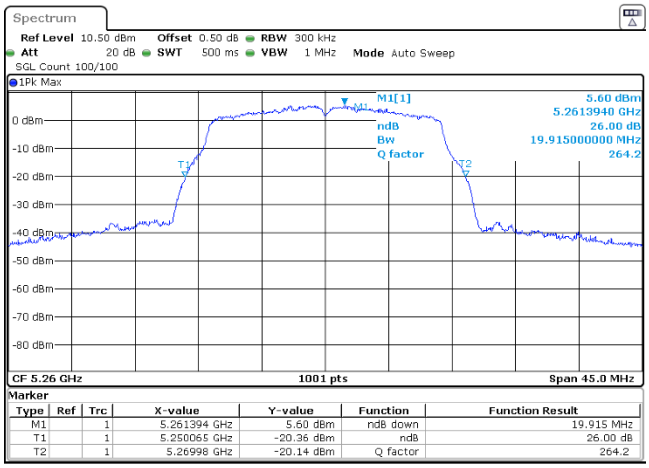


Figure 8.3-4: *26 dB Emission Bandwidth IEEE 802.11n MCS7, Channel 52: 5260 MHz*

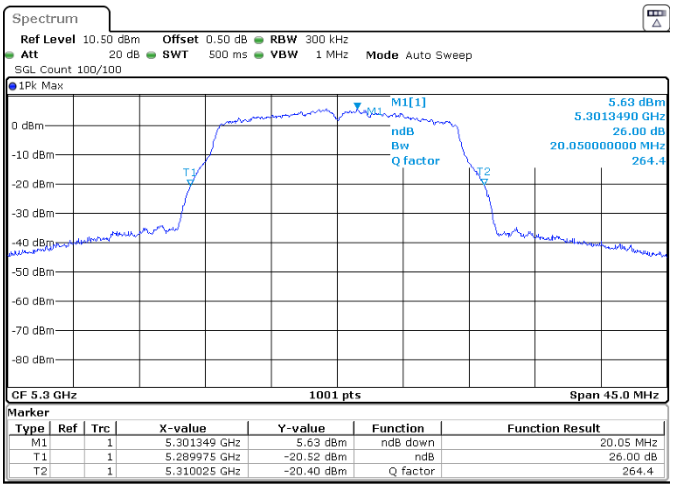


Figure 8.3-5: *26 dB Emission Bandwidth IEEE 802.11n MCS7, Channel 60: 5300 MHz*

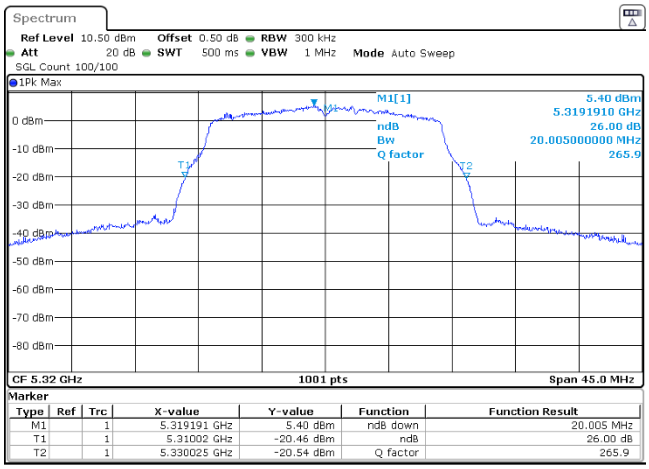


Figure 8.3-6*: 26 dB Emission Bandwidth IEEE 802.11n MCS7, Channel 64: 5320 MHz*

8.3.5 Test data, continued

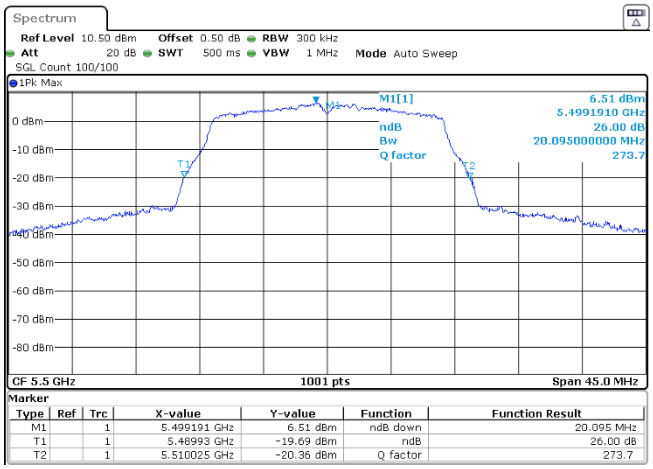


Figure 8.3-7: *26 dB Emission Bandwidth IEEE 802.11n MCS5, Channel 100: 5500 MHz*

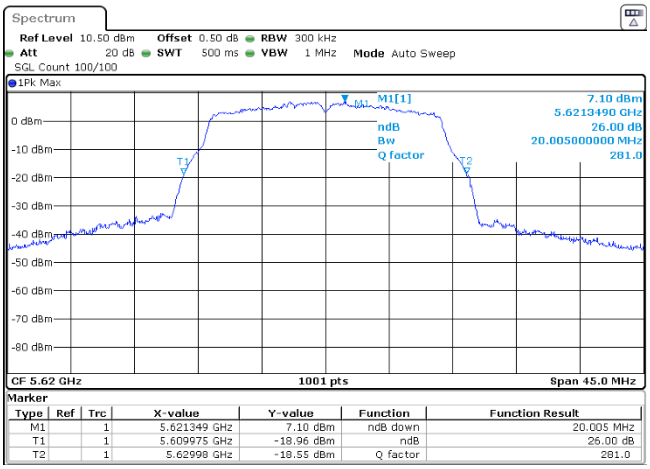


Figure 8.3-8: *26 dB Emission Bandwidth IEEE 802.11n MCS5, Channel 124: 5620 MHz*

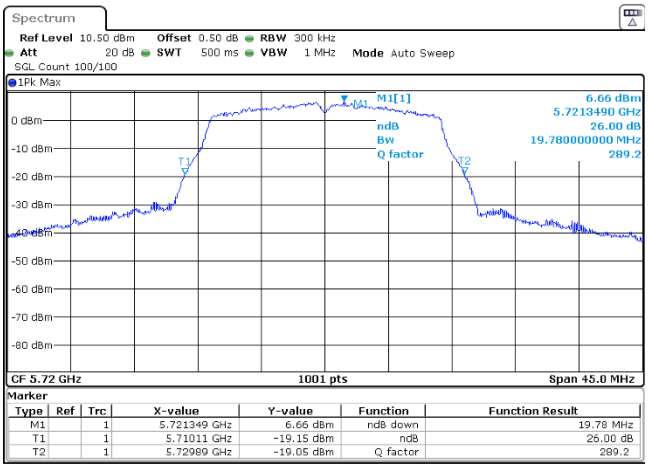


Figure 8.3-9: *26 dB Emission Bandwidth IEEE 802.11n MCS5, Channel 144: 5720 MHz*

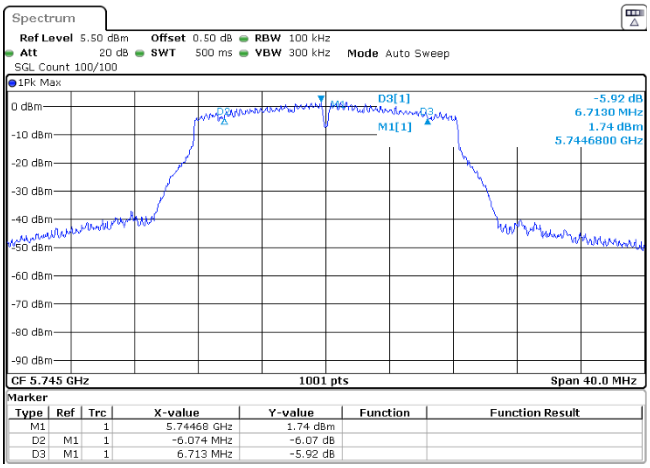


Figure 8.3-10: *6 dB Emission Bandwidth IEEE 802.11n MCS0, Channel 149: 5745 MHz*

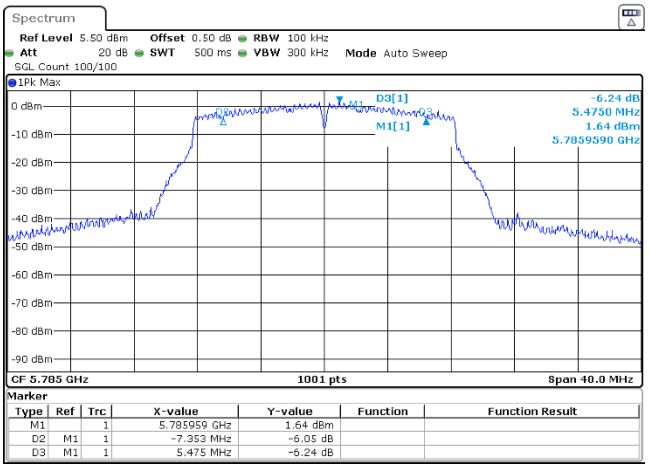


Figure 8.3-11: *6 dB Emission Bandwidth IEEE 802.11n MCS0, Channel 157: 5785 MHz*

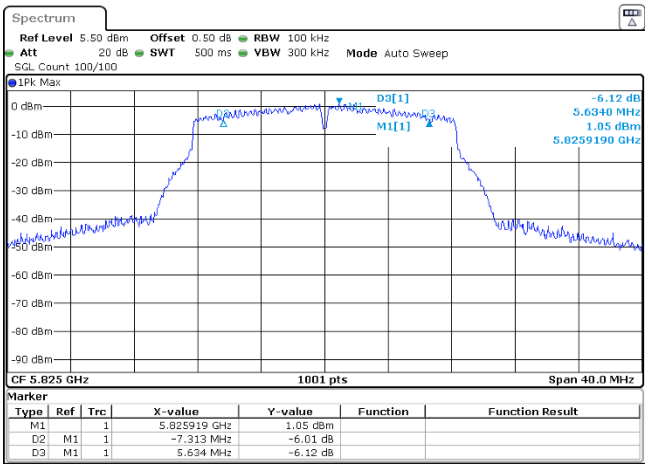


Figure 8.3-12: *6 dB Emission Bandwidth IEEE 802.11n MCS0, Channel 165: 5825 MHz*

8.4 FCC 15.407(b) and RSS-247 5.5 Radiated restricted band-edges and spurious emission

8.4.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart E → §15.407(b)

Table 8.4-1: *FCC §15.209– Radiated emission limits*

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.
For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Table 8.4-2: *FCC restricted frequency bands*

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.4.2 Test summary

Verdict	Pass		
Test date	July 11, 2022; July 12, 2022; July 13, 2022; July 14, 2022; July 15, 2022	Temperature	23 °C; 24 °C; 23 °C; 22 °C; 24 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure;	1008;1002;1003;1005;1007mbar
Test location	3m semi-anechoic chamber (Radiated)	Relative humidity	54%;55%;52%;51%:56%

8.4.3 Notes

The EUT was configured to transmit continuously on the lowest and highest channels according to clause 15.407 (b)(11).

The spectrum was search from 30 MHz to 40 GHz (10th harmonic of the highest transmit frequency but not more than 40 GHz).

Radiated measurements were performed at a 3 m measurement distance.

Only worst cases were measured for this test (table 8.1.6 as reference).

U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case)
U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case)
U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case)
U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case)

8.4.4 Setup details

EUT setup configuration	Tabletop
Test facility	Nemko San Diego
Measurement details	Radiated spurious emissions measurement performed as per C63.10 §12.7

Receiver settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	Peak (preview measurements) Quasi-Peak (final measurements)
Trace mode	Max Hold
Measurement time	5 s (final measurements)

Receiver settings for radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Average and peak (final measurements)
Trace mode	Max Hold
Measurement time	5 s (final measurements)

8.4.5 Test data: U-NII-1 band: 5150-5250 MHz

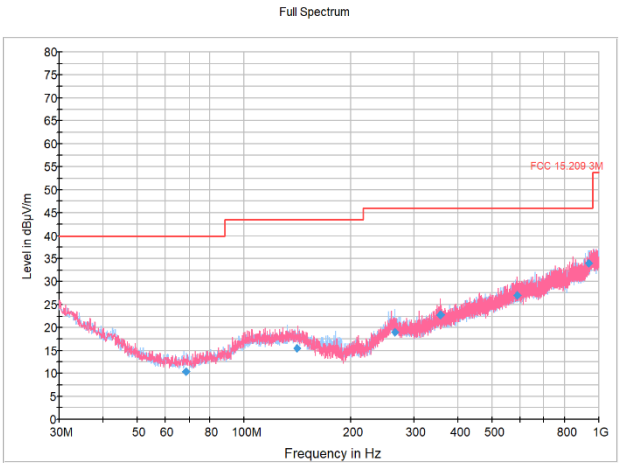


Figure 8.4-1: *Radiated emissions, 0.030-1 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

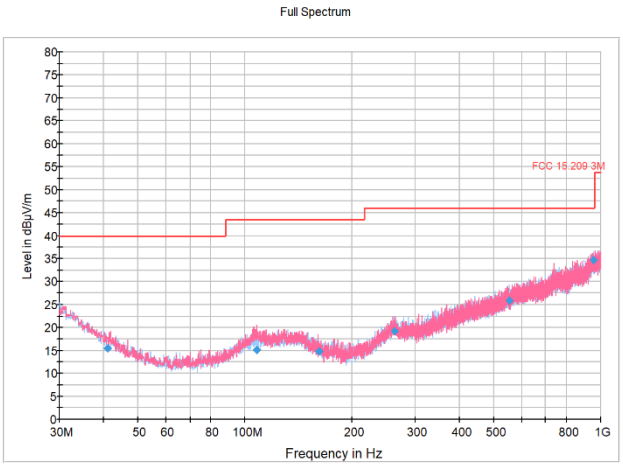


Figure 8.4-2: *Radiated emissions, 0.030-1 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
68.426000	10.29	40.00	29.71	5000.0	120.000	187.0	H	47.0	12.8
141.056000	15.50	43.50	28.00	5000.0	120.000	299.0	V	12.0	18.6
265.541000	18.98	46.00	27.02	5000.0	120.000	372.0	H	179.0	21.4
355.940000	22.72	46.00	23.28	5000.0	120.000	108.0	V	240.0	22.4
589.236000	27.07	46.00	18.93	5000.0	120.000	284.0	V	281.0	28.8
936.103000	33.94	46.00	12.06	5000.0	120.000	159.0	H	257.0	34.5

Table 8.4-3: *Radiated emissions results, 0.030-1 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
41.043000	15.46	40.00	24.54	5000.0	120.000	280.0	V	69.0	18.5
107.911000	15.16	43.50	28.34	5000.0	120.000	219.0	V	92.0	17.9
161.119000	14.84	43.50	28.66	5000.0	120.000	108.0	V	175.0	17.0
263.299000	19.15	46.00	26.85	5000.0	120.000	272.0	H	357.0	21.7
553.267000	25.84	46.00	20.16	5000.0	120.000	185.0	H	136.0	27.9
955.165000	34.64	46.00	11.36	5000.0	120.000	182.0	H	0.0	35.4

Table 8.4-4: *Radiated emissions results, 0.030-1 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5240 MHz (CH48)*

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-1 band: 5150-5250 MHz, continued

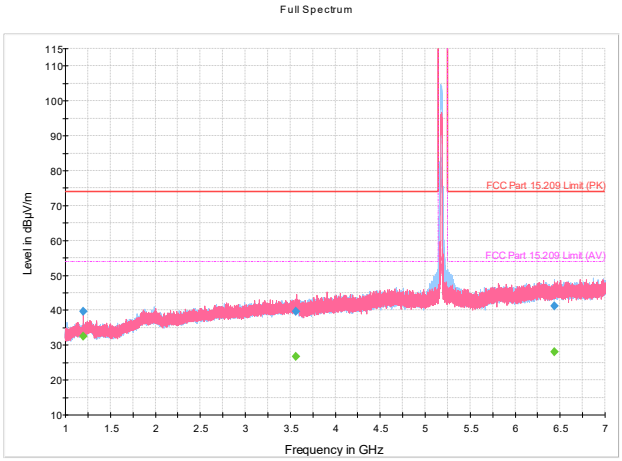


Figure 8.4-3: *Radiated emissions, 1-7 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

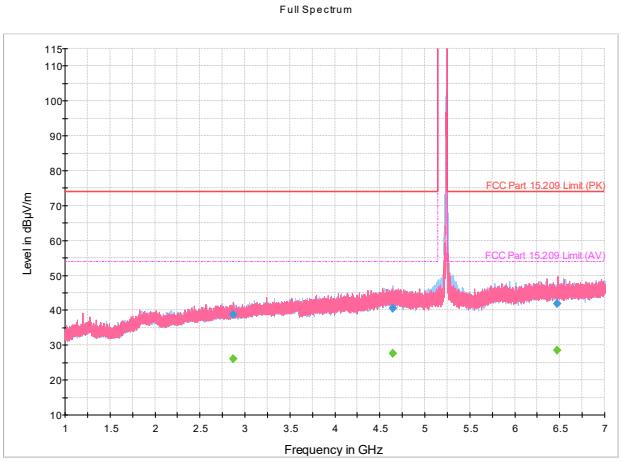


Figure 8.4-4: *Radiated emissions, 1-7 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1200.000000	39.60	---	73.90	34.30	5000.0	1000.000	185.0	V	295.0	-13.8
1200.000000	---	32.53	53.90	21.37	5000.0	1000.000	185.0	V	295.0	-13.8
3565.000000	---	26.62	53.90	27.28	5000.0	1000.000	364.0	V	21.0	-5.9
3565.000000	39.76	---	73.90	34.14	5000.0	1000.000	364.0	V	21.0	-5.9
6436.600000	41.13	---	73.90	32.77	5000.0	1000.000	338.0	H	59.0	0.2
6436.600000	---	28.00	53.90	25.90	5000.0	1000.000	338.0	H	59.0	0.2

Table 8.4-5: *Radiated emissions results, 1-7 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2870.600000	38.81	---	73.90	35.09	5000.0	1000.000	134.0	V	46.0	-8.4
2870.600000	---	26.05	53.90	27.85	5000.0	1000.000	134.0	V	46.0	-8.4
4643.400000	---	27.54	53.90	26.36	5000.0	1000.000	235.0	H	211.0	-1.9
4643.400000	40.62	---	73.90	33.28	5000.0	1000.000	235.0	H	211.0	-1.9
6475.000000	---	28.57	53.90	25.33	5000.0	1000.000	107.0	V	314.0	0.3
6475.000000	41.94	---	73.90	31.96	5000.0	1000.000	107.0	V	314.0	0.3

Table 8.4-6: *Radiated emissions results, 1-7 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5240 MHz (CH48)*

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)
[3] Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).

8.4.5 Test data: U-NII-1 band: 5150-5250 MHz, continued

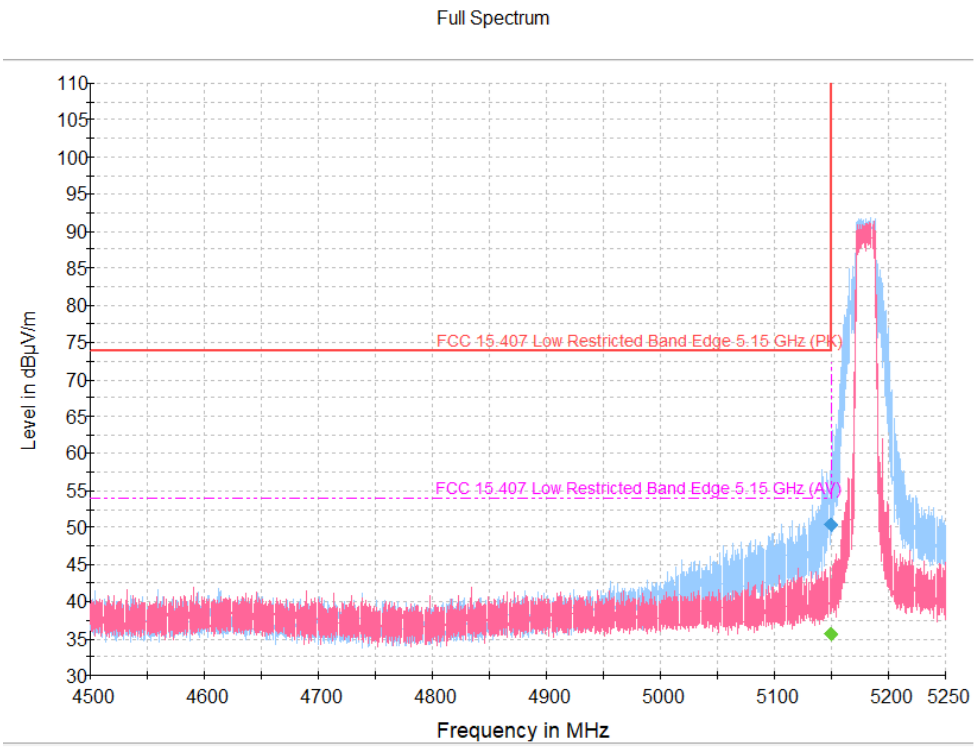


Figure 8.4-5: *Radiated emissions, restricted band edge, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5150.000000	50.40	---	73.90	23.50	5000.0	1000.000	170.0	H	20.0	-2.4
5150.000000	---	35.68	53.90	18.22	5000.0	1000.000	170.0	H	20.0	-2.4

Table 8.4-7: *Radiated emissions, restricted band edge, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz*

Notes:
[1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-1 band: 5150-5250 MHz, continued

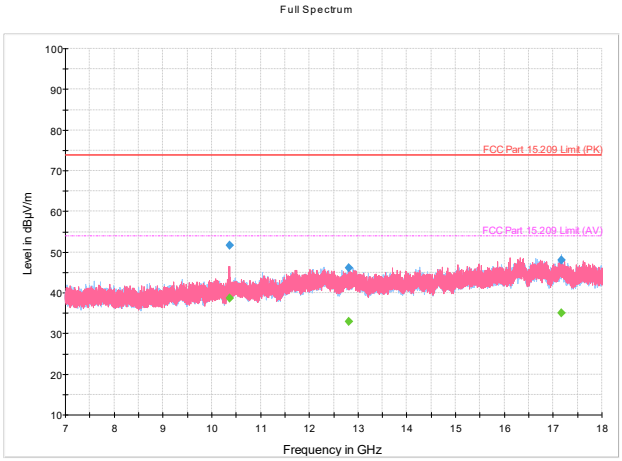


Figure 8.4-6: *Radiated emissions, 7-18 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

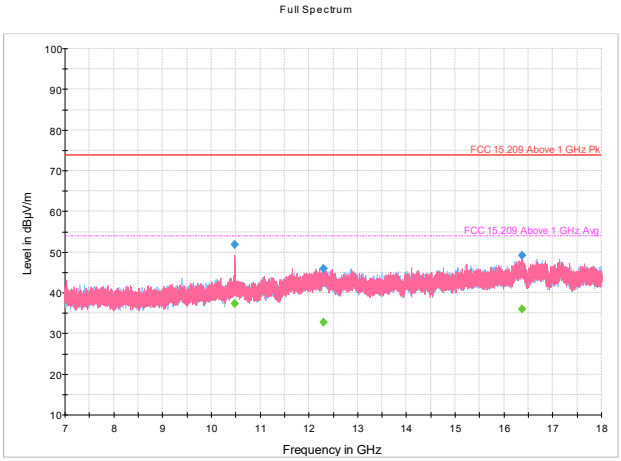


Figure 8.4-7: *Radiated emissions, 7-18 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10361.866667	---	38.57	53.90	15.33	5000.0	1000.000	200.0	V	100.0	3.7
10361.866667	51.66	---	73.90	22.24	5000.0	1000.000	200.0	V	100.0	3.7
12812.200000	46.05	---	73.90	27.85	5000.0	1000.000	291.0	V	71.0	8.7
12812.200000	---	32.98	53.90	20.92	5000.0	1000.000	291.0	V	71.0	8.7
17164.366667	---	35.00	53.90	18.90	5000.0	1000.000	326.0	H	85.0	14.5
17164.366667	47.96	---	73.90	25.94	5000.0	1000.000	326.0	H	85.0	14.5

Table 8.4-8: *Radiated emissions results, 7-18 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10481.966667	51.89	---	73.90	22.01	5000.0	1000.000	196.0	V	98.0	4.3
10481.966667	---	37.30	53.90	16.60	5000.0	1000.000	196.0	V	98.0	4.3
12300.066667	45.83	---	73.90	28.07	5000.0	1000.000	332.0	V	85.0	7.1
12300.066667	---	32.79	53.90	21.11	5000.0	1000.000	332.0	V	85.0	7.1
16370.766667	49.25	---	73.90	24.65	5000.0	1000.000	340.0	V	276.0	12.9
16370.766667	---	35.97	53.90	17.93	5000.0	1000.000	340.0	V	276.0	12.9

Table 8.4-9: *Radiated emissions results, 7-18 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Notes:

[1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)
[3]Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).
[4]A highpass filter was used for avoiding the saturation in the power amplifier.

8.4.5 Test data: U-NII-1 band: 5150-5250 MHz, continued

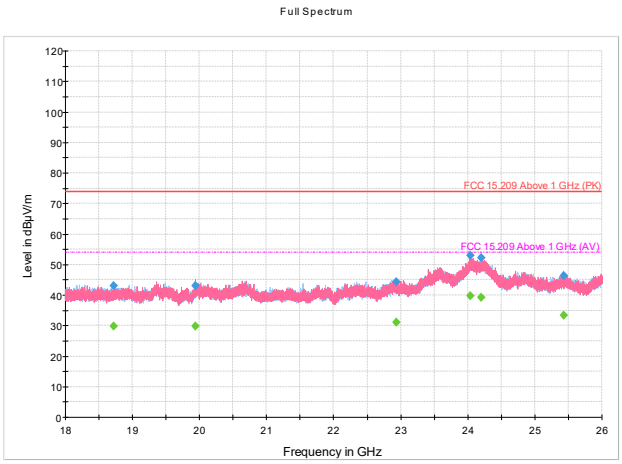


Figure 8.4-8: *Radiated emissions, 18-26 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

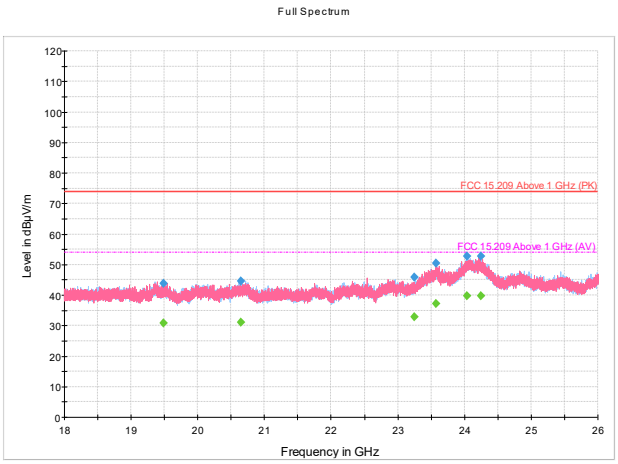


Figure 8.4-9: *Radiated emissions, 18-26 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18722.900000	---	29.71	53.90	24.19	5000.0	1000.000	400.0	V	74.0	17.7
18722.900000	43.00	---	73.90	30.90	5000.0	1000.000	400.0	V	74.0	17.7
19943.900000	---	29.84	53.90	24.06	5000.0	1000.000	204.0	V	0.0	18.1
19943.900000	43.02	---	73.90	30.88	5000.0	1000.000	204.0	V	0.0	18.1
22930.600000	44.24	---	73.90	29.66	5000.0	1000.000	130.0	H	256.0	21.1
22930.600000	---	31.13	53.90	22.77	5000.0	1000.000	130.0	H	256.0	21.1
24036.800000	53.00	---	73.90	20.90	5000.0	1000.000	216.0	H	110.0	29.7
24036.800000	---	39.80	53.90	14.10	5000.0	1000.000	216.0	H	110.0	29.7
24203.900000	52.25	---	73.90	21.65	5000.0	1000.000	194.0	H	289.0	29.2
24203.900000	---	39.21	53.90	14.69	5000.0	1000.000	194.0	H	289.0	29.2
25433.500000	46.43	---	73.90	27.47	5000.0	1000.000	329.0	H	305.0	23.9
25433.500000	---	33.48	53.90	20.42	5000.0	1000.000	329.0	H	305.0	23.9

Table 8.4-10: *Radiated emissions results, 18-26 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19484.400000	---	30.73	53.90	23.17	5000.0	1000.000	193.0	V	251.0	18.2
19484.400000	43.78	---	73.90	30.12	5000.0	1000.000	193.0	V	251.0	18.2
20643.700000	---	31.19	53.90	22.71	5000.0	1000.000	400.0	H	175.0	19.6
20643.700000	44.54	---	73.90	29.36	5000.0	1000.000	400.0	H	175.0	19.6
23253.800000	45.92	---	73.90	27.98	5000.0	1000.000	347.0	H	176.0	22.5
23253.800000	---	32.78	53.90	21.12	5000.0	1000.000	347.0	H	176.0	22.5
23574.300000	---	37.27	53.90	16.63	5000.0	1000.000	368.0	V	98.0	26.0
23574.300000	50.45	---	73.90	23.45	5000.0	1000.000	368.0	V	98.0	26.0
24039.500000	52.66	---	73.90	21.24	5000.0	1000.000	257.0	H	22.0	29.7
24039.500000	---	39.75	53.90	14.15	5000.0	1000.000	257.0	H	22.0	29.7
24249.500000	---	39.64	53.90	14.26	5000.0	1000.000	373.0	H	112.0	29.0
24249.500000	52.75	---	73.90	21.15	5000.0	1000.000	373.0	H	112.0	29.0

Table 8.4-11: *Radiated emissions results, 18- 26 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Notes:
[1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-1 band: 5150-5250 MHz, continued

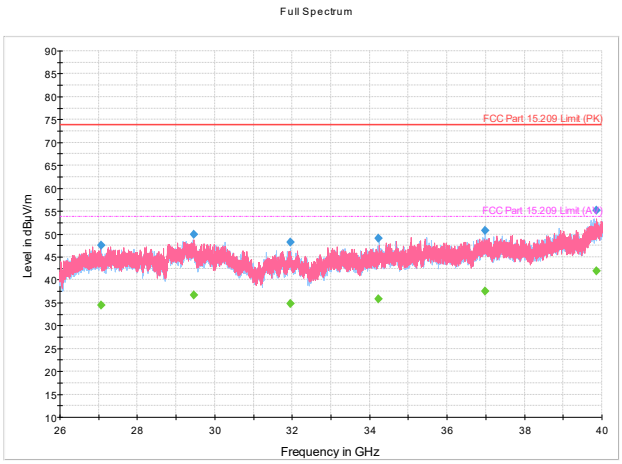


Figure 8.4-10: *Radiated emissions, 26-40 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

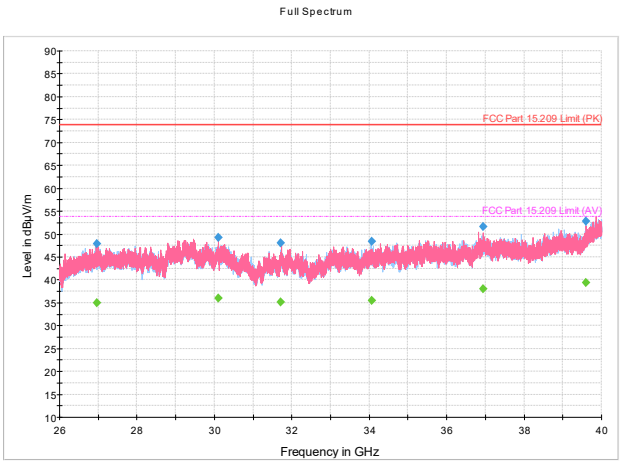


Figure 8.4-11: *Radiated emissions, 26-40 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27057.800000	---	34.54	53.90	19.36	5000.0	1000.000	189.0	V	214.0	9.0
27057.800000	47.62	---	73.90	26.28	5000.0	1000.000	189.0	V	214.0	9.0
29450.800000	---	36.72	53.90	17.18	5000.0	1000.000	107.0	V	44.0	12.6
29450.800000	49.90	---	73.90	24.00	5000.0	1000.000	107.0	V	44.0	12.6
31956.150000	48.19	---	73.90	25.71	5000.0	1000.000	182.0	H	276.0	12.5
31956.150000	---	34.84	53.90	19.06	5000.0	1000.000	182.0	H	276.0	12.5
34232.050000	---	35.86	53.90	18.04	5000.0	1000.000	197.0	H	2.0	13.5
34232.050000	49.10	---	73.90	24.80	5000.0	1000.000	197.0	H	2.0	13.5
36975.525000	50.84	---	73.90	23.06	5000.0	1000.000	125.0	H	11.0	15.9
36975.525000	---	37.48	53.90	16.42	5000.0	1000.000	125.0	H	11.0	15.9
39868.650000	---	41.99	53.90	11.91	5000.0	1000.000	163.0	V	116.0	21.7
39868.650000	55.19	---	73.90	18.71	5000.0	1000.000	163.0	V	116.0	21.7

Table 8.4-12: *Radiated emissions results, 26-40 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
26962.050000	47.92	---	73.90	25.98	5000.0	1000.000	175.0	V	11.0	8.9
26962.050000	---	34.91	53.90	18.99	5000.0	1000.000	175.0	V	11.0	8.9
30097.050000	---	35.91	53.90	17.99	5000.0	1000.000	138.0	V	5.0	11.9
30097.050000	49.17	---	73.90	24.73	5000.0	1000.000	138.0	V	5.0	11.9
31718.800000	48.01	---	73.90	25.89	5000.0	1000.000	135.0	V	70.0	11.9
31718.800000	---	35.17	53.90	18.73	5000.0	1000.000	135.0	V	70.0	11.9
34057.225000	---	35.52	53.90	18.38	5000.0	1000.000	168.0	H	280.0	13.0
34057.225000	48.42	---	73.90	25.48	5000.0	1000.000	168.0	H	280.0	13.0
36952.525000	---	38.00	53.90	15.90	5000.0	1000.000	158.0	H	121.0	15.9
36952.525000	51.56	---	73.90	22.34	5000.0	1000.000	158.0	H	121.0	15.9
39592.250000	---	39.30	53.90	14.60	5000.0	1000.000	154.0	H	0.0	18.8
39592.250000	52.72	---	73.90	21.18	5000.0	1000.000	154.0	H	0.0	18.8

Table 8.4-13: *Radiated emissions results, 26-40 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)*

Notes: [1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

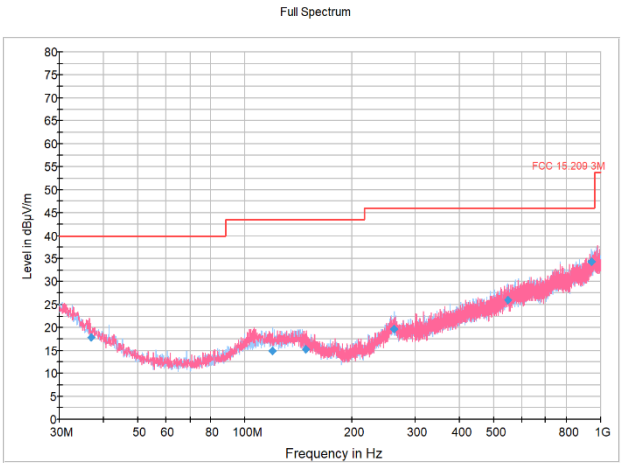


Figure 8.4-12: *Radiated emissions, 0.030-1 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

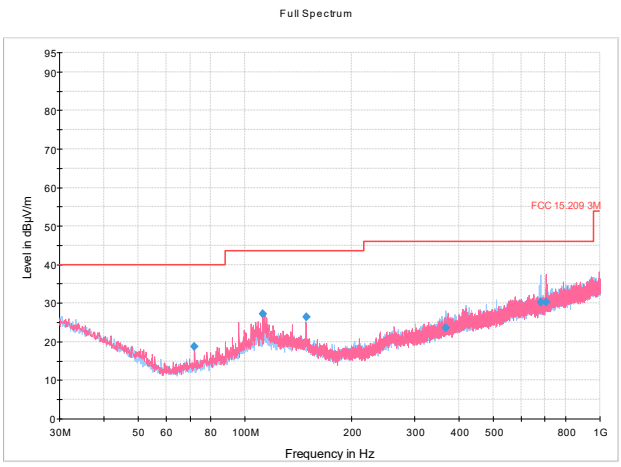


Figure 8.4-13: *Radiated emissions, 0.030-1 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
36.976000	17.90	40.00	22.10	5000.0	120.000	189.0	V	151.0	20.7
119.322000	14.98	43.50	28.52	5000.0	120.000	393.0	H	20.0	18.1
148.274000	15.21	43.50	28.29	5000.0	120.000	186.0	V	232.0	18.2
262.237000	19.66	46.00	26.34	5000.0	120.000	117.0	H	349.0	21.7
546.905000	26.05	46.00	19.95	5000.0	120.000	248.0	H	43.0	28.1
943.229000	34.28	46.00	11.72	5000.0	120.000	211.0	H	102.0	34.9

Table 8.4-14: *Radiated emissions results, 0.030-1 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
72.001000	18.83	40.00	21.17	5000.0	120.000	397.0	V	146.0	14.1
112.005000	27.24	43.50	16.26	5000.0	120.000	397.0	V	155.0	19.0
148.494000	26.39	43.50	17.11	5000.0	120.000	118.0	V	21.0	19.4
367.875000	23.64	46.00	22.36	5000.0	120.000	109.0	H	248.0	24.2
681.494000	30.24	46.00	15.76	5000.0	120.000	180.0	H	315.0	30.5
705.330000	30.18	46.00	15.82	5000.0	120.000	360.0	V	193.0	30.5

Table 8.4-15: *Radiated emissions results, 0.030-1 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

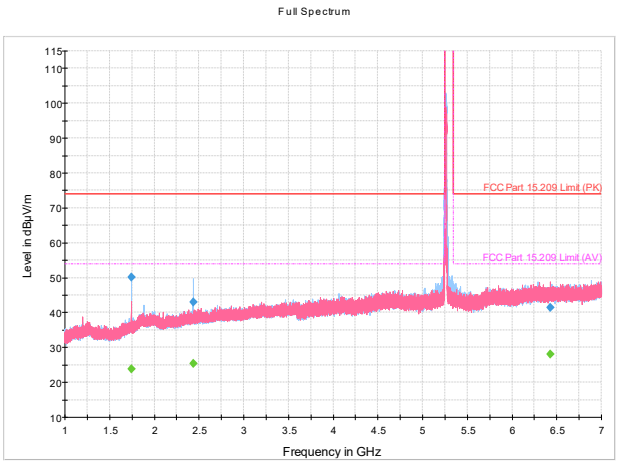


Figure 8.4-14: *Radiated emissions, 1-7 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

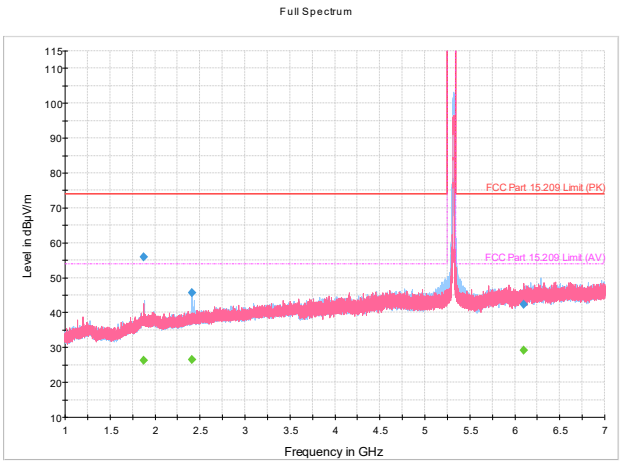


Figure 8.4-15: *Radiated emissions, 1-7 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1745.000000	50.23	---	73.90	23.67	5000.0	1000.000	235.0	H	60.0	-12.6
1745.000000	---	23.76	53.90	30.14	5000.0	1000.000	235.0	H	60.0	-12.6
2439.400000	42.92	---	73.90	30.98	5000.0	1000.000	250.0	H	323.0	-9.8
2439.400000	---	25.40	53.90	28.50	5000.0	1000.000	250.0	H	323.0	-9.8
6432.000000	41.40	---	73.90	32.50	5000.0	1000.000	340.0	V	290.0	0.2
6432.000000	---	28.12	53.90	25.78	5000.0	1000.000	340.0	V	290.0	0.2

Table 8.4-16: *Radiated emissions results, 1-7 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1878.600000	---	26.17	53.90	27.73	5000.0	1000.000	400.0	H	22.0	-10.7
1878.600000	55.82	---	73.90	18.08	5000.0	1000.000	400.0	H	22.0	-10.7
2410.400000	---	26.46	53.90	27.44	5000.0	1000.000	289.0	H	121.0	-9.9
2410.400000	45.68	---	73.90	28.22	5000.0	1000.000	289.0	H	121.0	-9.9
6100.000000	42.31	---	73.90	31.59	5000.0	1000.000	400.0	V	246.0	-0.3
6100.000000	---	29.11	53.90	24.79	5000.0	1000.000	400.0	V	246.0	-0.3

Table 8.4-17: *Radiated emissions results, 1-7 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Notes:
[1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)
[3]Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).

8.4.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

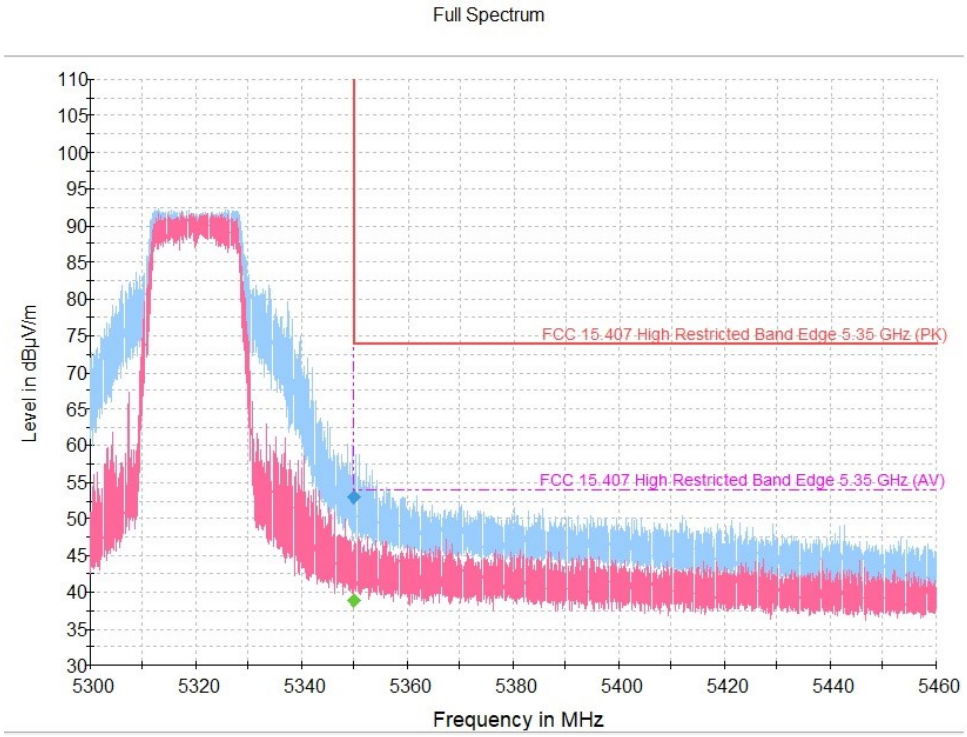


Figure 8.4-16: *Radiated emissions, restricted band edge, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5350.000000	52.97	---	73.90	20.93	5000.0	1000.000	169.0	H	305.0	-2.1
5350.000000	---	38.80	53.90	15.10	5000.0	1000.000	169.0	H	305.0	-2.1

Table 8.4-18: *Radiated emissions, restricted band edge, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Notes:
[1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

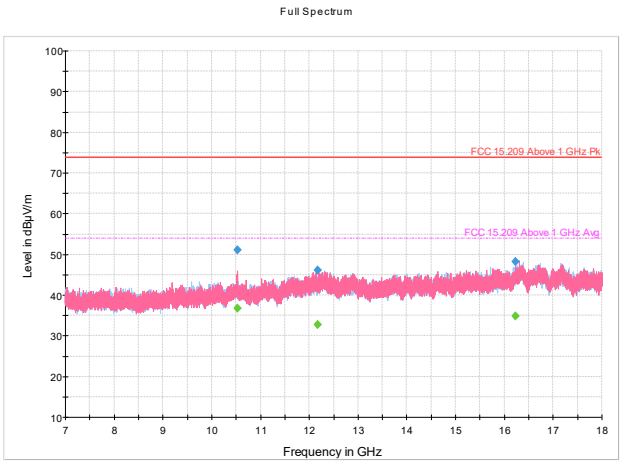


Figure 8.4-17: *Radiated emissions, 7-18 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

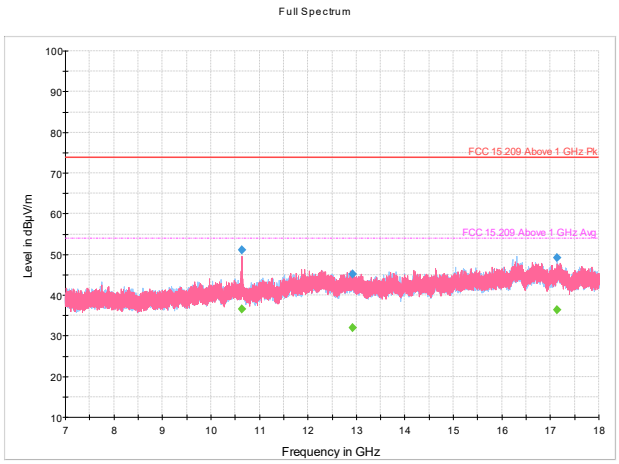


Figure 8.4-18: *Radiated emissions, 7-18 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10520.333333	---	36.75	53.90	17.15	5000.0	1000.000	203.0	V	95.0	4.4
10520.333333	51.14	---	73.90	22.76	5000.0	1000.000	203.0	V	95.0	4.4
12179.666667	46.02	---	73.90	27.88	5000.0	1000.000	387.0	V	286.0	6.8
12179.666667	---	32.70	53.90	21.20	5000.0	1000.000	387.0	V	286.0	6.8
16231.700000	---	34.92	53.90	18.98	5000.0	1000.000	292.0	H	73.0	12.8
16231.700000	48.27	---	73.90	25.63	5000.0	1000.000	292.0	H	73.0	12.8

Table 8.4-19: *Radiated emissions results, 7-18 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10641.300000	51.00	---	73.90	22.90	5000.0	1000.000	205.0	V	98.0	4.0
10641.300000	---	36.59	53.90	17.31	5000.0	1000.000	205.0	V	98.0	4.0
12917.166667	---	32.04	53.90	21.86	5000.0	1000.000	152.0	H	336.0	8.6
12917.166667	45.18	---	73.90	28.72	5000.0	1000.000	152.0	H	336.0	8.6
17141.533333	---	36.31	53.90	17.59	5000.0	1000.000	386.0	H	326.0	14.2
17141.533333	49.22	---	73.90	24.68	5000.0	1000.000	386.0	H	326.0	14.2

Table 8.4-20: *Radiated emissions results, 7-18 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Notes:

[1]Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2]Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)
[3]Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).
[4]A highpass filter was used for avoiding the saturation in the power amplifier.

8.4.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

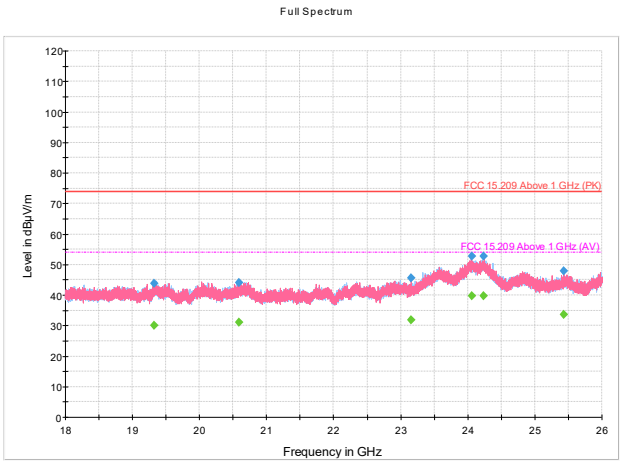


Figure 8.4-19: *Radiated emissions, 18-26 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

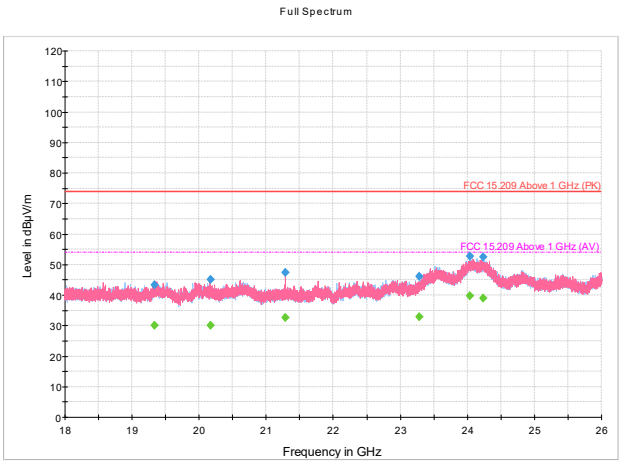


Figure 8.4-20: *Radiated emissions, 18-26 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19328.200000	43.79	---	73.90	30.11	5000.0	1000.000	161.0	H	0.0	18.5
19328.200000	---	30.18	53.90	23.72	5000.0	1000.000	161.0	H	0.0	18.5
20585.000000	44.06	---	73.90	29.84	5000.0	1000.000	378.0	H	187.0	19.1
20585.000000	---	30.97	53.90	22.93	5000.0	1000.000	378.0	H	187.0	19.1
23149.500000	---	31.80	53.90	22.10	5000.0	1000.000	193.0	V	346.0	21.1
23149.500000	45.49	---	73.90	28.41	5000.0	1000.000	193.0	V	346.0	21.1
24058.400000	---	39.86	53.90	14.04	5000.0	1000.000	294.0	V	239.0	29.7
24058.400000	52.82	---	73.90	21.08	5000.0	1000.000	294.0	V	239.0	29.7
24238.600000	52.84	---	73.90	21.06	5000.0	1000.000	110.0	V	34.0	29.0
24238.600000	---	39.70	53.90	14.20	5000.0	1000.000	110.0	V	34.0	29.0
25432.500000	48.00	---	73.90	25.90	5000.0	1000.000	129.0	V	34.0	23.9
25432.500000	---	33.55	53.90	20.35	5000.0	1000.000	129.0	V	34.0	23.9

Table 8.4-21: *Radiated emissions results, 18-26 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)*

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19338.500000	---	30.00	53.90	23.90	5000.0	1000.000	321.0	V	289.0	18.5
19338.500000	43.20	---	73.90	30.70	5000.0	1000.000	321.0	V	289.0	18.5
20166.300000	44.99	---	73.90	28.91	5000.0	1000.000	234.0	V	11.0	18.6
20166.300000	---	30.18	53.90	23.72	5000.0	1000.000	234.0	V	11.0	18.6
21280.200000	47.31	---	73.90	26.59	5000.0	1000.000	172.0	V	70.0	18.9
21280.200000	---	32.49	53.90	21.41	5000.0	1000.000	172.0	V	70.0	18.9
23283.500000	---	32.97	53.90	20.93	5000.0	1000.000	119.0	H	314.0	22.8
23283.500000	46.08	---	73.90	27.82	5000.0	1000.000	119.0	H	314.0	22.8
24041.800000	---	39.68	53.90	14.22	5000.0	1000.000	130.0	H	178.0	29.7
24041.800000	52.70	---	73.90	21.20	5000.0	1000.000	130.0	H	178.0	29.7
24235.600000	---	39.01	53.90	14.89	5000.0	1000.000	311.0	H	46.0	29.0
24235.600000	52.47	---	73.90	21.43	5000.0	1000.000	311.0	H	46.0	29.0

Table 8.4-22: *Radiated emissions results, 18-26 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)*

Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)